

ITEM 686.8037	CONFLICT MONITOR - 6 CHANNEL (SHELF MOUNTED) (NEMA - PLUS)
ITEM 686.8038	CONFLICT MONITOR - 12 CHANNEL (SHELF MOUNTED) (NEMA - PLUS)

DESCRIPTION

A signal conflict monitor shall be supplied for all solid-state load switches. The signal conflict monitor shall meet all the requirements of NEMA Publications TS-1-83. It shall be NEMA type 6 (6 channel) for 2-phase actuated controllers and NEMA type 12 (12 channel) for all other controllers. Each unit shall meet the requirements of the special note Electronic Equipment.

MATERIALS AND FUNCTIONAL REQUIREMENTS

This unit, when connected to the field terminals of the signal light circuits, shall be capable of detecting simultaneously conflicting vehicle and/or pedestrian traffic signal lights, as well as the absence of red indications. The monitor shall include both the positive and negative side of the AC sine wave supplied to the traffic signal light indicators.

This conflict monitor, when connected to the field terminals of the signal light circuit, shall provide protection against conflicting signals resulting from controller failure, relay or solid-state load switch failure, short circuited field wiring, etc.

The conflict monitor, upon sensing conflicting signals or unsatisfactory operation voltages, shall cause the transfer of the signal to a flashing indication. The controller assembly shall be wired in such a manner as to provide flash transfer if the unit is removed from service.

When such conflicting indications develop, the controller shall freeze in the condition that existed at the moment of conflict and shall remain frozen until reset by maintenance personnel. This shall be accomplished by having the monitor send to the controller a stop timing command.

There shall be mounted on the front panel a visual indicator to provide an indication when the monitor has operated to protect against a conflicting signal condition or voltage error.

The equipment shall also provide a front panel-mounted reset pushbutton for restoration of normal operation.

SPECIFICATION

The conflict/voltage monitor shall comply with PART 6 of NEMA STANDARD TS-1 1983. In addition, the unit must also be capable of detecting the following error conditions:

- 1) Simultaneous sensing of active yellow and green or walk inputs on a channel.
- 2) Simultaneous sensing of active red and green or yellow or walk inputs on a channel.

If either of these conditions exist for less than 200 milliseconds, the unit shall not trigger. If either of these conditions exists for more than 500 milliseconds, the unit shall trigger.

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- 3) Absence of a 2.8 second period of an active yellow input on a channel during a red to green to yellow to red sequence.

Functions #1 and/or #2 and #3 shall be enabled on a per channel basis via front panel accessible programming devices. One or both of the above dual combinations (#1 and #2) shall be selectable via front panel accessible programming devices.

- 4) Absence of a logic input transition from the cabinet controller watchdog circuitry for 1500 milliseconds (+/- 100 milliseconds) shall cause the unit to trigger. This function shall be enabled via a front panel accessible programming device.
- 5) Absence of or an improperly seated Programming Card shall cause the unit to trigger.

Should one of these conditions exist which triggers the unit, it shall cause the Output relay contacts to transfer. These contacts shall remain in this state until the unit is reset by activation of the front panel control or the external reset input. AC+ power interruption shall not reset the unit once it has been triggered. Upon restoration of AC+ power to the unit, all display indicators shall return to their original state before the interruption.

- 6) A Walk Disable function shall be provided which will modify operation of Red monitoring. If this function is enabled via a front panel accessible programming device, the unit shall trigger if it senses the absence of active green, yellow, and red inputs of a channel regardless of the state of the walk input.
- 7) A Voltage Monitor Latch function shall be provided which will sense an improper voltage level at the Controller Voltage Monitor input or either of the +24V Monitor inputs and cause the unit to trigger. If this function is enabled via a front panel accessible programming device, restoration of the proper voltage levels will not reset the unit. Only a manual reset or external reset will reset the unit.
- 8) When the AC+ line voltage is below the drop-out level of 92V rms for 475 milliseconds (+/- 25 milliseconds), the unit will suspend all fault monitoring functions, de-energize the Output relay, and de-energize the Start relay. The POWER indicator on the front panel will blink at a rate of 2Hz to indicate the brown-out status.
- 9) When the AC+ line voltage returns above the restore level of 100V rms for 100 milliseconds (+/- 16 milliseconds), the monitor will resume normal operation and the POWER indicator on the front panel will remain illuminated. After a 2.5 second (+/- 1 second) delay, the Start relay will be energized. After a programmable delay

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determined by a front panel accessible programming device, the Output relay will be energized. This delay shall be programmable from 4 seconds to 15 seconds in 1 second increments. A 0.5 second delay shall be provided for test purposes.

- 10) An internal watchdog circuit shall be provided to assure continuous operation of the internal microprocessor device. Failure of this circuitry to detect a logic input transition from the microprocessor device for 100 milliseconds or a DC supply voltage sufficient to assure proper operation shall cause the unit to trigger.
- 11) If a reset command is received from either the front panel control or the External Reset input for a continuous duration of more than 120 seconds, the unit will ignore the reset command and begin normal monitoring functions.
- 12) A real time clock shall be provided to mark the date and time when the unit is triggered by an error condition. Backup power to the real time clock shall allow it to maintain timing accuracy during interruptions of AC+ power to the unit. Automatic adjustments should be made to the time of day and date to accommodate leap years and Daylight Savings time.
- 13) In addition to displaying the fault status and field output status for an error condition which may have the monitor unit currently triggered, the unit shall maintain a complete record of at least the last three faults which caused the unit to trigger. These events should be able to be reviewed at any time via activation of a front panel control. This fault record shall not be lost due to AC+ power interruptions.
- 14) All critical timing functions shall be accomplished by digital methods and shall utilize either the power line frequency or a quartz crystal based timer. All monitoring functions except Conflict monitoring shall have a dedicated timer unique to each channel being monitored.

THE MINIMUM DISPLAY INDICATORS REQUIRED ARE AS FOLLOWS:

- 1) Triggering of the Conflict monitoring portion of the unit.
- 2) Triggering of the Red monitoring portion of the unit.
- 3) Triggering of the Sequence monitoring portion of the unit.
- 4) Triggering of the Dual monitoring portion of the unit.
- 5) Triggering of the Controller Voltage Monitoring or Controller Watchdog monitoring portion of the unit.
- 6) Triggering of the +24V Monitor #1 portion of the unit.
- 7) Triggering of the +24V Monitor #2 portion of the unit.
- 8) Triggering of the Program Card monitoring portion of the unit.
- 9) Triggering of the internal watchdog portion of the unit.
- 10) Time of day and date display.
- 11) Four indicators per channel which display an active red, yellow, green, or walk

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input for each channel monitored.

- 12) AC+ power indicator which is flashing when AC+ power is below 92V rms and illuminated when AC+ line voltage returns above 100V rms.

CONSTRUCTION DETAILS

ENVIRONMENTAL REQUIREMENTS

The conflict monitor shall meet the environmental conditions required of control equipment as specified in NEMA Standard TS I1983.

QUALITY ASSURANCE REQUIREMENTS

The conflict monitor shall meet the following factory acceptance test and design approval test requirements in accordance with the Special Note Electronic Equipment. The Contractor shall prepare all required test procedures and data forms for approval by the Engineer.

FACTORY ACCEPTANCE TESTS

The Contractor shall conduct or cause to be conducted, as a part of the factory acceptance test procedure, environmental testing of all units delivered under this contract. The environmental test procedures to be followed shall be those of the transient voltage, temperature, low voltage and high voltage portions of the environmental tests specified in Revision 1 to the NEMA Standards Publication for Traffic Control System TS I-1983, part 6 Conflict Monitor TS I-6.06.

The Contractor shall furnish all data taken during these tests to the Engineer-in-Charge.

DESIGN APPROVAL TESTS

The design approval tests specified in NEMA Standard TS I-1976 (through Rev. 2) shall be satisfied.

METHOD OF MEASUREMENT

Each conflict monitor in place and accepted by the Engineer-in-Charge will be measured as a single unit.

BASIS OF PAYMENT

Payment for each conflict will be made for the measured quantity as the contract price per each; which price shall be full compensation for all labor, tools, materials, equipment and incidentals.